

How to have a **good** career in computer science

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First...

- Who am I? (why should anyone believe me?)
- This is *advice*, not a rulebook (ask around)
- This mostly isn't about doing good research (you need to do that too)
- Please interrupt and ask questions

Today's problem statement

- Input: N years of your effort
- Goal: you get a job
 - Mainly focused on academic or industrial research, but applies for all jobs
- Problem: what should you do during those N years to maximize your job options?

What do **you** think is important?

- Research quality?
- Who your advisor is?
- Problem selection?
- Being able to hack?
- What school you come from?
- Story-telling?
- Being able to prove theorems?
- Publications?
- Who you know?
- Speaking and writing skill?
- Thesis?

Getting a job: top down

- How do you get a job?
 - You interview (1-2 days)
 - Give a great talk on fascinating new research
 - Impress *everyone* in one-on-ones
 - Various political issues outside your control
- How do you get an interview?
 1. The people there **already like you**
 2. You have **great letters from leaders** in field
 3. You have **publications in great places**
 4. Other...(a very hard place to be)

Today

- Networking
- Communications
- Research issues
- Misc tips

Networking

(not packets, but people)

- *Its not who you know, its who knows you*
- **Myth:** your work speaks for itself (and you)
 - Little Reality #1: most people haven't read your publications (feel lucky if they skimmed it)
 - Little Reality #2: many people attending your talk were gossiping in the hall or didn't listen
- **Reality:** it is **your** responsibility to be “known” to your community, not their responsibility to know you
 - But your advisor, friends and colleagues can help

Networking at conferences/workshops

- **Show up**
 - Go to the top conference in your field each year (even if you have to pay some/all of your own way!)
- **Become visible**
 - Spend time with people from **outside UCSD**
 - Grad students from other schools. Why?
 - Faculty/researchers from elsewhere
 - Your advisor, friends can help (how?)
- **Learn to have a conversation**
 - There are interesting topics outside your research
 - Do not be arrogant, but don't be a pushover either
- **Follow-up**

Networking via research internships

- Do them if you can (why?)
 - Learn about other research, ways of doing things
 - Get strong external letter
 - Be introduced to wider group of people in your community
 - Ok to even do 2-3 (best not in last couple years)
- Plan to write a paper on what you did (even if you have to do all the work)
- If you have choices pick based on mentor and not based on project
 - Keep in touch with your mentors (and fellow interns)
- BTW, you'll make a pile of \$\$\$ vs TA/GSR

Networking at home

- **Other faculty**
 - You will need 3-5 letters, yet you don't have 3-5 advisors... hmmm?
 - Go to seminars in your area regularly; introduce yourself to other faculty
- **Other students**
 - Leave your lab
 - The senior grad student down the hall may be on the hiring committee at some school in two years
 - You have to know more than just your field
- **Visitors**
 - Go to distinguished lectures in any area (why?)
 - If there is a chance to meet visitors in your area, do it

Communications issues

- **Myth:** great research shines through
- **Reality:** great communications skills are as important (if not more so) than research
- Key issues
 - **Story-telling**
 - **Writing**
 - **Presentation**

Storytelling

- All papers and talks are first and foremost exercises in storytelling
 - How should you think about my problem?
 - Why should I care about the problem?
 - Why should I care about your solution?
 - Must grab attention without being arrogant
- This isn't just sophistry: the *story* is a large part of the academic contribution
 - Example: RAID
- Terribly under-rated in importance...

Beginning story-telling tips

- Figure out what *kind* of paper you're writing
- Find good examples of that *kind* of paper
 - Ask around if you're not sure
- Try to understand (or copy) the approach taken by those exemplars

Newell's kinds of theses (applies equally well to papers)

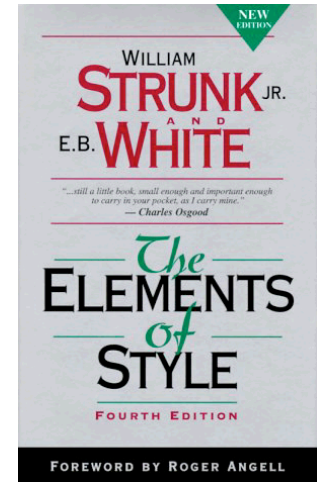
- **Opens up new area**
- **Provides unifying framework**
- **Resolves long-standing question**
- **Thoroughly explores an area**
- **Contradicts existing knowledge**
- **Experimentally validates theory**
- **Produces an ambitious system**
- **Provides empirical data**
- **Derives superior algorithms**
- **Develops new methodology**
- **Develops a new tool**
- **Produces a negative result**

Intros: writing and presentation

- The Intro is perhaps the most important parts of any paper/presentation
 - Sets context
 - Explains how to look at the problem
 - Presents most impressive result
 - Keeps interest of reader in the first minute/page
- What needs to be in there
 - Why does anyone care about this problem?
 - What is done currently?
 - What is your key insight into improving it?
 - How much better are you making it?

Writing

- Writing is absolutely critical
(by far, easiest way to get your paper rejected)
- Read Strunk and White
- Read examples of well-written papers in your field
- Think about writing in three pieces:
 - Introduction (sells the story)
 - Organization (what is beginning, middle, end)
 - What does each section need to demonstrate ?
 - How is it linked to its neighboring sections?
 - Paragraph structure within each section
 - Transition, context, meat, resolution, segue
- You must practice
 - Multiple drafts
 - Write routinely and throw it away
 - Get help from other students or from other campus resources



Common writing mistakes

- Writing like you speak
- Bad segues (why did the last paragraph end)
- Flat introduction (most important part of paper)
- Don't define terms (what's a quatloo again?)
- Don't mention limitations or hide weaknesses (kick me)
- Aren't clear what's *been* done vs what *could* be done
- Related work (not researched, or dumps on everyone)
- No spell check or grammar check
- One draft and ship it
- Run-on sentences
- **Passive voice**
 - Experiments have been conducted to test the hypothesis (passive)
 - We conducted experiments to test the hypothesis (active)

Presentation

- Critical – easiest way to not get a job after getting an interview
- Need to condense story into 20-30min (paper talk) or 50min (job talk) slot
- Need to hold interest and not lose people, yet clearly do something important and hard
- But can't possibly cover all details
- Need to speak clearly, concisely and confidently
- Then people will try to tear you down (Q&A)

Presentation Tips

(mostly from David Patterson)

- Use illustrations – minimize text (this is a bad talk BTW)
- Be concise in using text (no sentences)
- Use large type (24 point min)
- Use color to separate features
- Don't do that slide covering thing
- Skip slides if you need to (figure out which ones you can skip in advance)
- Do not over-animate (only use animation if it helps understanding)
- Allocate 2 minutes per slide and leave time for Q&A
- Humor – but only if you're funny (its not up to you)
- You **MUST** practice in front of real people – multiple times!

Q&A issues

- Do practice Q&A – really... do this.
- Prepare backup slides around obvious questions
- Make sure you understand the question before you answer
- If you don't know the answer, **don't** make one up – **ever**.
- Prepare how to handle tough questions:
 - Questioning the premise
 - We did it at IBM in the 1950s
 - I believe there is a flaw in lemma 6
 - How is this different from xxx?
- Learn how to defer
- If you're *very* funny, learn how to use humor to diffuse

Research issues

- **Topic selection**
 - Pick a topic that **someone** cares about
 - Improvement on known problem vs new problem (how to demonstrate innovation)
 - Short term vs long term (tradeoff)
 - Track technology trends and changes
- **Problem definition**
 - Avoid LPUs
 - But don't need to solve everything in one paper (art)
- **Publications**
 - Venue more important than quantity
 - Collaboration is good, not bad (huge multiplier and increases breadth and quantity)

Research issues #2

- How long on a problem?
 - Your approach will have flaws (don't give up)
 - Don't follow a rat-hole forever (no results for a year is a big warning sign)
- Methodology
 - Be rigorous in your evaluation
 - Strive to do realistic evaluations (counter-example: economic computer virus analysis)
 - This may mean implementing something!
 - Or at least getting real data!
 - Experimental fields: especially true
 - Most compare to best known work

Meta issue:

Understanding your community

- You need to understand your community, both for selling your research and for networking
- What is a community?
- Who are the leaders in your community
 - Whose papers get published?
 - Who is on the PC?
 - Who is being cited?
- What are the hot/contentious topics?
 - Read the last two proceedings of the top conferences
 - Ask around which were the best papers
 - Ask why? Do you agree?

Graduate Career Pitfalls

- I need the most famous advisor
- I rule (arrogance)
- I suck (self-deprecation)
- Wait for advisor to tell you what to do (XXX)
 - Be assertive about what you need
- Follow advisor's advice blindly
 - Need to be able to argue with advisor
- I need to do great work from day #1
- I need to work solo/carve out my niche on day one
 - Group projects help your career
 - Counterpoint: be careful with very large groups
- Not honest with self about career prospects

Other resources

- <http://www.cs.berkeley.edu/~pattnsn/talks/BadCareer3.ppt>
- `www.cs.berkeley.edu/~pattnsn/talks/writingtips.html`

Questions?